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# HORSE-BREEDING SUGGESTIONS FOR FARMERS

TWO LINES of profit are derived by the use of specially selected mares on farms: Raising colts and doing farm work.

To obtain the maximum gains from this system, the animals used for work on the farm should be brood mares and the young horses which are increasing in value.

Mares chosen for work and breeding must be well-bred, sound individuals of desirable conformation. It does not pay to raise scrub colts.

Mares doing this double duty should receive extra feed, care, and management.

The selection of a stallion is highly important. A low service fee should not tempt one to use an inferior stallion.

- It is advantageous to produce a uniform lot of foals. Select breeding animals with this in view.

There may be less interference with the farm work if the mares foal in the fall.

Careful choice in mating creates greater possibilities for the offspring, but these possibilities are realized only when nourishing feed and regular attention are given the young animals.

The plan suggested is an advance toward producing better horses.

Remember that good breeding, proper feed, and careful management are essential to realize most returns from the colt crop.

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# HORSE-BREEDING SUGGESTIONS FOR FARMERS

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## PROFIT IN BREEDING FARM MARES

FINANCIAL profit results from breeding mares that earn their feed by furnishing farm horsepower. Instances of this are often cited in farm papers. It is not uncommon to read of some remarkable mare that, besides doing her share of the farm work, has raised many hundreds of dollars' worth of colts. (See fig. 1.) These accounts seldom tell of more than one such mare on a particular farm, whereas to obtain the greatest returns nearly all the work animals maintained on the farm should be mares of this kind.

Breeding the working mares places double duty on them; consequently they should be robust individuals of proper conformation and must have good care and treatment. With two sources of profit from one animal, farmers can well afford to pay more for such stock, feed it more heavily, and give it special attention. The small farmer is the one who is most likely to get the best results from such a plan, because he usually works his own teams or is in position to watch them closely and see that they are not ill treated.

## SELECTING BREEDING AND WORKING MARES

The two outstanding requirements in profitable farm mares are that they be breeders and workers. If a good, registered stallion is available, purebred mares of the same breed will probably give better returns than grades. It costs practically no more to raise a purebred colt than it does to raise a grade, and the returns are much greater. The amount of capital that can be invested in the mares is an important factor in determining whether purebreds should be

[1] Revised by J. O. Williams and S. R. Speelman, Animal Husbandry Division. Mr. Reese resigned December 31, 1926.

used. The particular breed type that the purebreds or grades should conform to depends largely on local market demands. Some communities are noted for and attract buyers of high-class drafters; others have local dealers who handle many choice harness horses, and still others have a steady outlet for saddle horses; consequently in a locality favored with any such markets it is generally advisable to breed the prevailing type, since by so doing sales are more easily made and the services of high-class stallions are practically assured.

However, some persons have a decided preference for a particular breed or type, and where this is so a greater success often is made by raising the kind naturally preferred, although it must be remem-

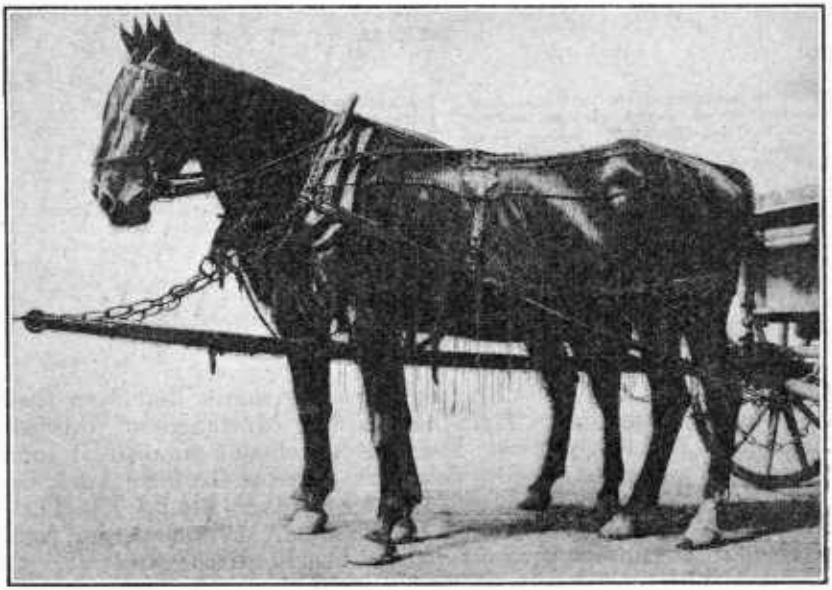

FIG. 1.—The near mare in this team, besides doing more than enough work to pay for her feed, has produced 11 live foals. Before producing her first foal she was used for three years in livery work. Her offspring have been sold for good prices

bered that it is difficult to show a profit when raising something for which there may be a limited demand. It is generally accepted that light horses are best suited to rolling and semimountainous land, while drafters are more adaptable to level country.

### UNIFORMITY OF THE MARES

Uniformity in the mares kept on a particular farm generally is not given much consideration. There is satisfaction and convenience, however, in having mares similar enough in type and action so that one can readily fill the place of another at any kind of farm work. Such mares are especially desirable when it is necessary to work three or four abreast. In case four are needed to a wagon, it is a good advertisement of the owner's judgment and ability as a horseman to have them all uniform, in good condition, and hooked up to a nicety. If the mares resemble one another and are bred to the same stallion

it is often possible to sell the young horses as pairs, in which form they nearly always bring a premium. The market for horses bred in this manner will not be overcrowded very soon, as can readily be attested by anyone who has been confronted with the difficult task of purchasing from farmers mated pairs of a certain type.

### DESIRABLE CONFORMATION OF MARE

Breed characteristics in purebred or grade mares signify impressive ancestry and prepotency. Femininity of expression and of conformation is an indication of good breeding qualities. Style, good disposition, quality, clean, flat bone, concave, open feet, strong con-

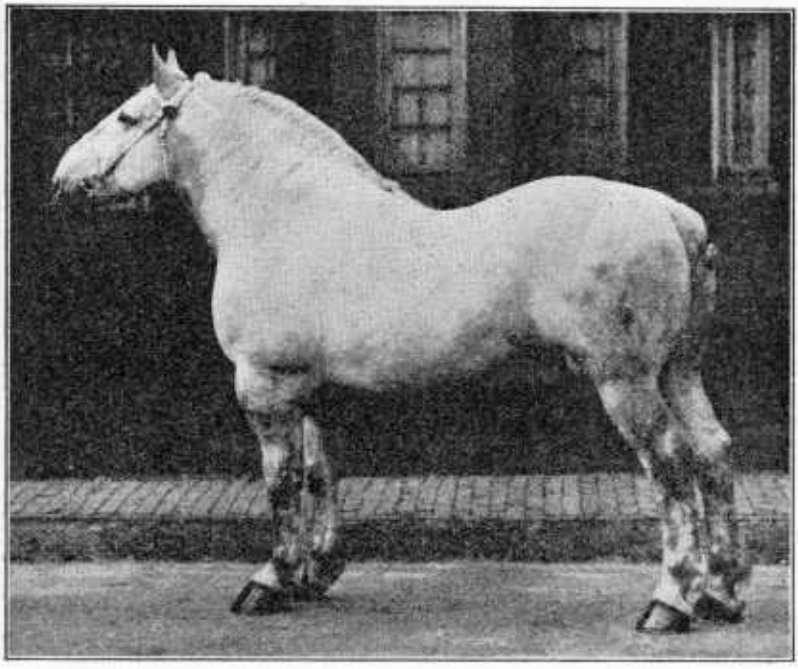

FIG. 2.—A draft stallion, showing well-set underpinning, substance with quality, short, smooth coupling, well-sloped shoulders, and a head denoting intelligence and refinement

stitution, good proportions, deep, roomy barrel, width across the hips denoting a large pelvic arch, and well-developed vulva and teats are qualities especially desired in breeding mares. An inspection of the colts the mare produces is the best evidence of her worth as a brood mare. The length of usefulness as producers varies greatly with different mares. Some produce excellent colts when 25 years of age, but if they produce until they are 15 years old they do very well. Much depends on the individuals and the way they are handled. Shy breeding mares are generally unprofitable producers.

### SOUNDNESS

Unsound horses cause breeders much financial loss; consequently it is of great importance that all horses reared should be as sound as

possible. Horses become unsound either because the tissue or the structure (or both) at a particular point of the body is weak, or because the strain exerted on the part is greater than the best tissue and best conformation could stand. Of course, if bad conformation exists, it is agreed that animals thus built should not be used for breeding purposes whether they are sound or not. When considering horses that are unsound but apparently have good conformation, it usually is difficult to decide whether the conformation is at fault or whether an unbearable strain was the cause; consequently these animals, too, should not be used as breeders unless it is positively

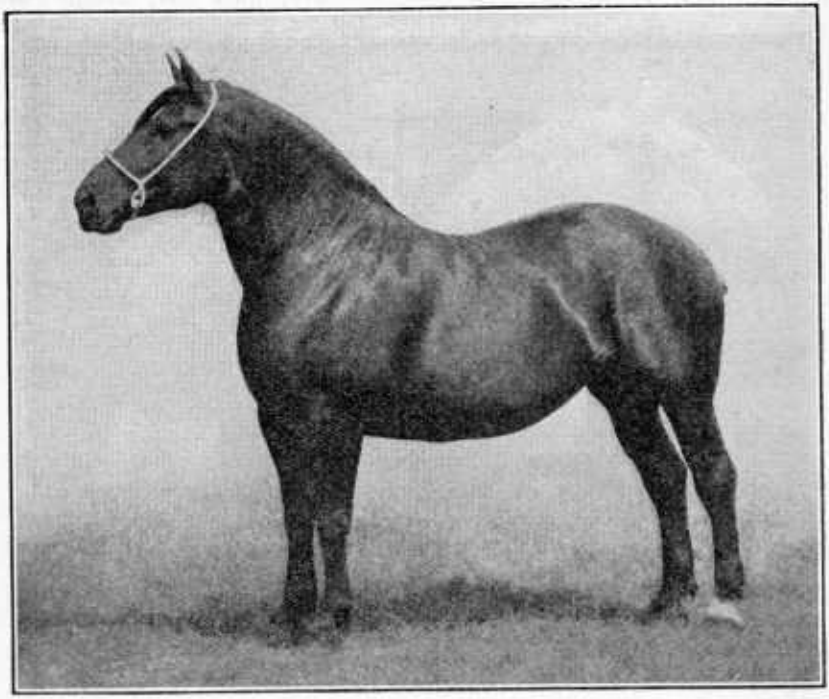

FIG. 3.—Draft mare of desirable conformation. Note especially the femininity and quality of this mare and her exceptional breediness, as indicated by the clean-cut head and deep roomy body

known that the unsoundness developed after severe labor had been performed in amount or degree much greater than that performed by the average horse.

The following kinds of unsoundness are regarded by the Bureau of Animal Industry as sufficient to bar a mare from being bred to a Government stallion: Bone spavin, ringbone, sidebone, heaves, stringhalt, roaring, periodic ophthalmia (moon blindness), and blindness, partial or complete. This list was compiled in consultation with the members of the American Veterinary Medical Association and practical horsemen throughout the country. In the cases of stallions, a more strict standard of soundness generally is followed than with mares. The stallion-registration laws of various States usually prescribe the unsoundnesses which bar stallions from public

service. Some States have a longer list than others. Without discriminating, however, the list given above is one on which horsemen generally agree. The unsoundnesses there given are the most common and are detected readily.[2] The elimination of unsound breeding stock, the feeding of balanced rations that will insure proper development of bone and tissues, and careful handling and management of colts are the right steps to take in eliminating unsoundness from horse stock.

### SELECTING A STALLION

A low service fee never should tempt one to use an inferior stallion. It also may pay better to use a stallion which stands at some distance rather than one that is more convenient. While the cost of a

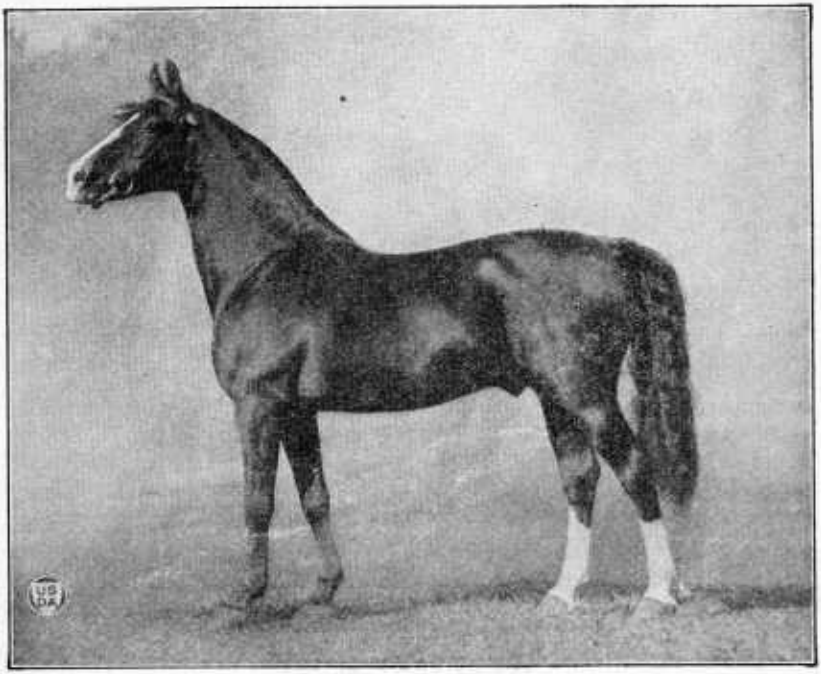

FIG. 4.—Light stallion with well-set limbs, substance, and quality

stallion is not always in proportion to his worth as a sire, the service fee generally is, if the horse has been standing long enough for mare owners to be able to pass judgment on his prepotency and on the quality of the colts he gets. The opinion of disinterested horsemen, together with the stallion's show winnings, will aid in making a good selection. Weight is an indispensable quality in a draft stallion, although it should not offset a deficiency in other respects. In the lighter stallions style, smooth lines, and swift, well-balanced action are necessary to improve light-horse stock. In any breed good feet, clean, flat bone free from meatiness, well-defined hocks, good disposition, quality, animation, and breed characteristics are

[2] For further information consult Farmers' Bulletin 779, "How to Select a Sound Horse."

well worth looking for in the sire. It is poor policy to use anything but a sound purebred stallion free from manifest faults of conformation, and he should be of the same breed or type as the mare. It must be borne in mind, too, that a stallion that is not properly fed and exercised is not likely to get a large proportion of strong healthy colts. In short, too much care can not be exercised in obtaining a suitable mate for the mares and the fundamental law that generally holds in all breeding operations must always be remembered, viz, like produces like or the likeness of an ancestor.

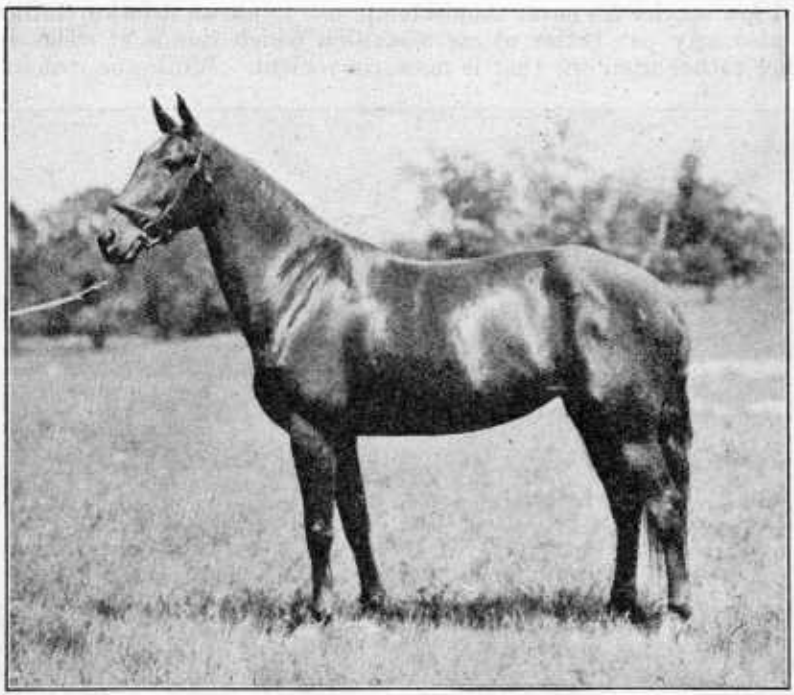

FIG. 5.—Light mare of desirable conformation. Quality, smooth lines, animation, and indications of strong constitution are shown

## CARE OF THE STALLION

The stallion should be kept in good condition throughout the year. Neglect during most periods and special attention during the breeding season form a too common practice that should be avoided. Each day the stallion should have feed, water, exercise, grooming, salt, sanitary surroundings, and comfortable quarters.

Following are suggested daily rations for 1,200 and 2,000 pound stallions receiving moderate exercise:

1,200-pound stallion:

(*a*) 10 pounds oats; 3 pounds bran; 15 pounds mixed hay.

(*b*) 6 pounds shelled corn; 7 pounds oats; 8 pounds timothy hay; 7 pounds alfalfa hay.

2,000-pound stallion:

(*a*) 17 pounds oats; 4 pounds bran; 22 pounds mixed hay.

(*b*) 10 pounds shelled corn; 11 pounds oats; 10 pounds alfalfa hay; 12 pounds timothy hay.

When comparatively little exercise is given, some laxative feed should be included in the ration. Among the laxative feeds may be listed grass, linseed meal, wheat bran, alfalfa hay, and carrots.

During the breeding season the stallion should receive a ration relatively high in protein. The addition of 2 pounds of ground peas or beans is advisable. Linseed meal, soy beans, cowpeas, field peas, wheat bran, and the legume hays are high in protein content.

Working the stallion is advisable. When the exercise or work is increased, the grain allowance should be increased. A paddock for exercise is recommended. Six miles of jogging each day is considered moderate exercise for a light stallion. Walking 5 miles each day is sufficient exercise for a draft stallion.

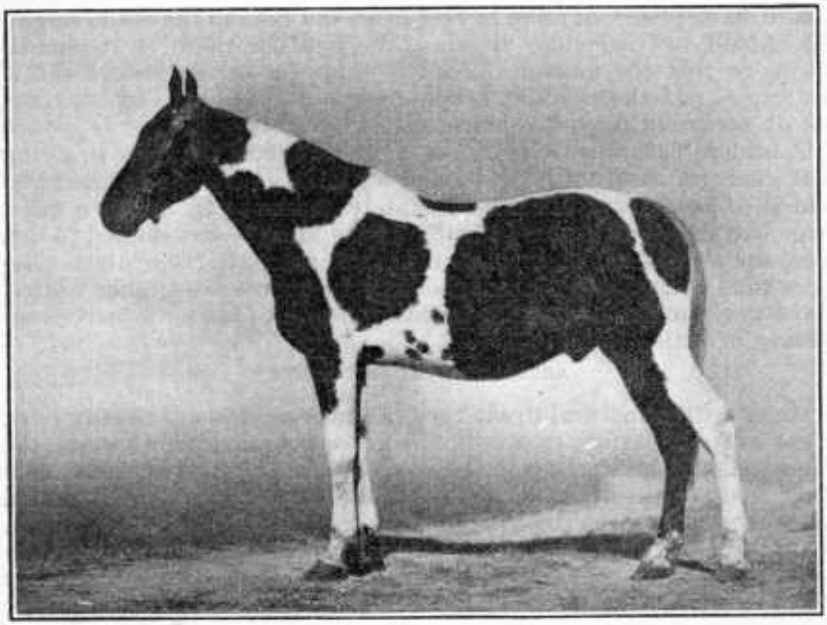

FIG. 6.—A spotted stallion of inferior breeding, with undesirable hind legs. The offspring of this horse do not find a ready sale because of their color and crooked hind legs

The stallion should not be excessively fat during breeding season as this condition may render him impotent. One service daily is preferable in most instances for mature stallions. If it is necessary to breed twice in one day, have the matings as far apart as possible, preferably one in the morning and the other late in the afternoon.

## MATING CONSIDERATIONS

Only very well-developed draft mares should be bred as young as 2 years of age. All others should go until 3 years, and some even until 4 if they are not strong or are slow in maturing. If bred at 2 years of age, draft mares should not be bred during the third year, thus giving them a chance for further development. Mares conceive most readily 9 days after foaling, and after this they generally come in heat about every 18 or 21 days until they become pregnant.

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This period varies somewhat, however, even in the same mare. Some mares fail to show signs of being in heat even when tried regularly with a stallion, but they usually can be made to want the services of a stallion in a few days by giving them either a forced service or by opening them up with the hand which has first been thoroughly cleansed. To take the mare to the stallion divides the work up better than to expect him to hunt up each mare. Furthermore, better accommodations are afforded at the stallion's stand for teasing and serving mares, and accidents are less liable to occur. The mare will react at breeding time with more certainty if she is in a healthy, vigorous condition. Extreme fatness interferes with the mechanical and physiological performance of the reproductive organs, while thin or weak mares do not readily "catch." The mare should have plenty of time to rest after she gets to the stallion, and she should be tied close to him. Very often there is too much hurry, so that the mare is forced to take the service before she is just right. If the weather is cold, warm the mare up by exercise, but do not breed her when extremely hot or fatigued.

Considerable responsibility rests on the owner of the mare in seeing that she is returned to the stallion every 18 to 21 days to be tried and rebred, if necessary. This is absolutely necessary in order to get a large percentage of mares in foal. If the mare is accustomed to dry feed, she should not be turned on pasture soon after breeding. Besides thus changing her feed, she may be annoyed by other horses. Hard work immediately after breeding may also hinder a mare from getting in foal.

### ARTIFICIAL IMPREGNATION

Mares with unnatural discharges from the vagina are usually hard to get in foal. Before the stallion is allowed to make the service, the vagina should be washed out with a warm 2 per cent solution of a good coal-tar disinfectant and then flushed out with clear, warm water that has been boiled. These precautions not only aid in settling the mare but also eliminate the chance of spreading an infection. It is still better to breed such mares artificially after the organs have been cleansed as just directed.

For those inexperienced in artificial impregnation, a little exploring with the hand, first covering the arm with petrolatum, will make them familiar with the arrangement of the mare's reproductive organs. The large, roomy passage found directly on entering the mare is the vagina and it is on the floor of this compartment that the seminal fluid can be collected. Advance the hand to the mouth of the womb, which is in the center of a prominent projection into the forward end of the vagina. Be careful not to mistake the mouth of the urinary duct, or urethra, which is on the floor of the vagina, for the large and more interior mouth of the womb. The latter must be dilated by the fingers before attempting to insert the seminal fluid.

Any syringe that has a good, strong suction, that is durable and has the proper curve or is made of pliable material, will do to collect the semen from the floor of the vagina. It may be advisable in most cases to use a breeding bag in the mare or on the stallion to aid in collecting the fluid. It can then either be squirted from the syringe into the uterus, or half-ounce gelatine capsules may be filled and one

of them placed in the uterus of each mare to be bred. Or, the gelatine capsule may be used alone by holding it between the thumb and finger and scooping the fluid into it by the aid of the index finger. The capsule may then be pushed into the uterus of the same mare or carried in the hand and inserted into the uterus of another mare. The hand will keep the fluid warm and exclude light, both of which are necessary precautions. The syringe should be kept at a temperature of 101° F. and the operation must be done as rapidly as possible to prevent chilling the fluid.

Syringes should be sterilized between operations. The operator's hands must be thoroughly washed and the finger nails kept short and clean. Cleanliness is absolutely necessary in this operation, both to impregnate the mare successfully and to prevent disease.

Artificial impregnation places the male seminal fluid in the uterus, or womb, which point it must reach in order that a fetus may be formed. This overcomes any condition which interferes with the fluid's reaching the uterus during a natural service, such as acid secretions at the mouth of the uterus, an abnormal, twisted neck, or deposits of substances which close the opening. For this reason some mares which have not "caught" by natural service may catch by artificial service. One service of the horse generally produces fluid enough to impregnate three or four mares artificially.

### BREEDING RECORDS

Records of the breeding of each mare should be kept in order that the approximate time of foaling may be known. The period of gestation; that is, the time between the fertilization of the ovum and the birth of the young, is variable. This period is ordinarily calculated at 11 months and to be safe the owner must make preparations for the arrival of the foal not later than that time. The period, however, may vary between 330 and 360 days. A number of reasons have been advanced to explain why there is such a variance in the length of the mare's gestation period. One theory claims that a considerable time may elapse between the service and the actual fertilization of the ovum by the sperm cell. Another explanation is that the date of foaling has considerable influence on the length of time that the mare carries her young. This latter consideration appears to have a great deal of merit, for at the U. S. Morgan Horse Farm, Middlebury, Vt., records show that mares foaled after June 1 averaged 338 days for the gestation period, while those foaling earlier in the season had a gestation period of 347 days. This apparently was not due to difference in individual mares, as the same mares showed a marked difference in the longer time they carried early foals as against late foals. The natural time for foals to come is in the spring, when the air is warm and there is grass, sunshine, and an opportunity for range and freedom. Modern farming methods, however, especially in certain localities, have made it advisable to change nature's ways; consequently the farmer may find it better for

the mare to be heavy in foal or suckling a foal in the fall, when the heaviest part of the farm work is over. Flies are not so troublesome in the fall as in the spring, and during the comparatively idle winter months the mare can give practically all her energy to furnishing milk for the foal. By the next spring the young animal will be ready to turn on pasture, where it will require but little attention. However, fall foals can be raised successfully only when special care and feed are provided during the first winter, and where a warm, dry, light, and well-ventilated box stall can be furnished each mare and foal.

### FEED AND MANAGEMENT OF MARES IN FOAL

The mare will be healthier and the foal stronger at birth if she is used at slow, light work nearly every day; also, parturition is easier. In the summer, if it is not possible to work a mare, she

FIG. 7.—Brood mares and foals in desirable condition and showing the effects of good pasture. Aside from its high cost in most localities, the board fence shown is ideal for surrounding horse pastures

should be turned into an open pasture, where she can get exercise, fresh air, and nutritious feed. Her feed should supply the demand for the maintenance of her own body and also for the development of the fetus. The ration, therefore, should contain a little more protein and ash than that demanded by a working gelding. Furthermore the proportions of these should be increased gradually as the gestation period progresses. If the mare is idle in winter most of the feed may be roughage, but a heavier ration must be fed when work is done. The quantity of feed is determined by the size and condition of the animal (whether thin or fat, sick or well), by the appetite, by the amount of work done, by individuality, condition of the droppings, and whether the animal is easy or hard to keep.

### GRAINS

Oats are the best grain for the horse; they are a light, palatable, and balanced feed. Corn is a good grain, but is used to best advan-

tage if it forms only from one-third to one-half of the grain ration of the brood mare. If wheat is fed, it must be given ground or rolled and in small quantities. Barley is a good horse feed; it is more bulky than wheat and more nearly like oats than corn in composition. Barley is often cooked and fed once or twice a week in the evening for its medicinal qualities. In most instances it is preferable to grind or roll barley before feeding. Bran is an almost essential horse feed and acts as a regulator and a preventive of overfeeding. It is bulky and palatable and lightens the ration. Soy beans and cowpeas are relished by horses and serve as a useful addition to the grain feed for mares in foal. They are relatively rich in protein and consequently combine well with corn.

### ROUGHAGE

Timothy hay is the popular roughage for horses. Brome grass makes good hay which is equal to timothy hay in feeding value. Orchard grass, if cut in early bloom, is equal to the best of the hay grasses, and carries considerably more crude protein than timothy. Meadow fescue is not so valuable as timothy for horses. Sudan-grass hay is a safe feed for mares, and numerous native prairie grasses furnish hay that is equal to timothy. Clover hay is liable to be dusty, but it has good feeding qualities. Millet is not a safe feed for mares in foal. Corn fodder is used frequently to feed idle horses in the winter, but there is not nutrition enough in it alone for mares in foal. The same thing is true, in a greater degree, of straw. If either is used, good-quality hay also should be fed. Unthreshed cowpea or soy-bean hay is also a valuable roughage which is relished by horses. Even the threshed hay is moderately nutritious. It should not be fed to brood mares if it contains any mold. Alfalfa hay makes an excellent feed for mares if it is fed once a day and timothy or corn fodder given at the other feeding. Occasionally alfalfa hay is not properly cured, causing it to mold badly, in which case it should not be fed to the horses. Farmers have reported occasionally that alfalfa causes the kidneys to act too freely, but it is probable that this trouble will not be noticed if the alfalfa does not make up more than one-half of the roughage.

### SUCCULENCE

Succulent feeds are those which are juicy and easily assimilated. Such feeds have a cooling, laxative effect on the digestive system and stimulate the appetite. The most common succulent feeds on farms are grass, carrots, rutabagas, sugar beets, and silage. Grass, although of a succulent nature, is generally used as the entire ration throughout the summer if the mares are idle. If they are worked, grass usually forms a supplement to the hay and grain. Brood mares should be allowed access to grass whenever available, compliance being made with precautions later mentioned.

### ABORTIONS

Figures obtained from the United States Second Horse Breeding District show that in some localities as high as 7 per cent of the mares impregnated abort each year. It is quite possible that all abortions are not reported or are not known, in which case the per

cent would be still higher. As abortions generally are due to kicks, strains, slips, squeezing through narrow doorways or partly closed gates, excessive riding, driving, or pulling, and improper or moldy feed (such as moldy corn fodder and heavily frostbitten grass), it is evident that American farmers are losing many thousands of dollars yearly by careless and injudicious handling and management of their brood mares. Furthermore, breeders often have difficulty in gettting in foal a mare that has previously aborted, so that the loss may be a far-reaching one. If of the contagious character, abortion may turn a profitable band of brood mares into a practically valueless one so far as breeding is concerned.

To sum up briefly, proper feed of sufficient quantity and variety, regularly supplied, uniform moderate work, and careful handling will maintain an in-foal mare in proper physical condition to develop a healthy, strong fetus.

### APPROACHING PARTURITION

Mares heavy in foal should not be taken from work suddenly, but should be kept in harness at light work (if already accustomed to it) until within a week or a few days of foaling time. A week or so before parturition there is a sinking of the muscles of the croup, falling of the abdomen, and filling of the udder. At this time the mare should become accustomed to being quartered in a dry, sanitary, pleasant, quiet, light, comfortable, and roomy box stall. If not accustomed to pasture she should not be allowed it at this time, but should be given exercise in a dry lot after she is no longer worked. Moderate exercise is desirable, and occasionally it is necessary to have a sluggish, idle mare led a short distance each day in order that she may get sufficient exercise. Too much exercise at this time is just as detrimental as not enough, and a knowledge of the mare's previous success in delivering a foal, coupled with judgment, will determine the nature and amount of exercise as well as feed, etc., that should be allowed. Wax and sometimes milk will be found on the teats a day or so before foaling. Idle mares frequently develop an udder a longer time before parturition than mares that are worked regularly.

### PARTURITION

Indications of immediate parturition are uneasiness, lying down and getting up, switching the tail, and biting the sides and flanks. If possible, be present when the foal comes. Many mares, of course, will not bring forth their young (if able to keep from it) while they are being watched, but it usually is possible to hide quietly in an adjoining stall until the foal is delivered. Parturition generally lasts 10 to 15 minutes; if it extends to 4 or 5 hours the colt will come dead. In normal presentation of the fetus, either the forelegs extended with the head resting on them or the hind legs extended will first make their appearance through the vulva. Any other presentation may be attended with difficult parturition, in which case a competent veterinarian should be summoned.

First after the foal is dropped see that it begins to breathe. Take the film of tissue from its nostrils, and if respiration does not start

immediately blow into the mouth, work the ribs, and rub the body with a wisp of hay. Put the foal in one corner of the stall on clean fresh straw, and remove all the afterbirth and discharged fluids. Clean the stall thoroughly, scatter lime on the bare floor, and then cover it with clean bedding. The afterbirth should be burned or buried deeply with a thick covering of lime. It is one of the best mediums for bacteria of various kinds to develop in; hence it is essential to dispose of it properly.

Foals at birth usually weigh from one-twelfth to one-tenth as much as their dams.

Sunshine is a great enemy of disease germs; consequently plenty of light should be provided in the stables. A common but unhealthful practice, in sections where bank barns are prevalent, is that of having the box stalls next to the bank side of the barn. Besides the lack of light in such stalls they are liable to be damp, yet it is in such places that mares frequently bear their foals and the latter are housed. A window is inexpensive and will do much good in such cases.

### CARE OF FOAL

Foals should nurse after they gain strength enough to get on their feet and walk around. In the case of weak or very crooked-legged foals it may be necessary to assist them in getting to the teat, but often an effort is made to force them to nurse before they are ready. Nature takes its own time on such occasions, and hurrying and bustling may do more harm than good. Before the foal nurses, wash the mare's udder with a warm 2 per cent solution of a good coal-tar disinfectant and then rinse with warm water. The first milk which comes from the mare is known as colostrum and acts as a physic on the foal, causing the fecal matter in the intestines to be discharged, hence the folly of milking the mare before the foal comes merely because there appears to be too much milk in the udder. If the contents of the bowels are not ejected naturally within 24 hours, 2 to 4 tablespoonfuls of castor oil shaken in milk should be given, and it also may be advisable to inject warm water or 2 ounces of castor oil into the bowels. Repeat this treatment every 3 or 4 hours until the bowels move. Petrolatum applied in the rectum may aid in ejecting subsequent dry matter.

To offset the danger of navel infection in foals (which causes a disease known as joint-ill), the navel cord should be washed several times a day by holding up around the cord a large-necked bottle which has been nearly filled with a 1 to 1,000 solution of corrosive sublimate (bichloride of mercury), or by saturating the stump with full-strength tincture of iodine. Then dust it with powdered slaked lime. This should be repeated each day until the navel cord drops off. In case the navel does not dry properly or shows inflammation, a veterinarian should be called. Mares are inclined to be peevish or cross when with their young; consequently it is advisable to perform the foregoing precautions as speedily as possible, and then leave the stable so that the mare and foal can rest.

### FEEDING AFTER FOALING

The mare should not be fed heavy grain or hay for the first 24 hours after parturition and the first feeding should consist of a bran

mash with a little cooked flaxseed meal in it. A little oatmeal soaked in warm water also is appropriate. If the mare is constipated give laxative feeds. In two or three days, if doing well, she may be put back on dry feeds. In a week, if she is put back to work, she can have full feed. The mare may be put in harness, if light work is done, two or three days after foaling, but it is hard on the foal and may injure the mare's udder. It is best to turn the mare and colt into a lot where they can exercise and yet be quiet, but care should be taken at first to see that the foal is not chilled by staying out too long in cool, disagreeable weather or by lying on cold, damp ground. They should not be on grass if the mare has not been on grass before.

In a little more than a week the mare may be safely put to work provided she previously had been worked. If the foal is left in the stall, the mare should be brought to the stable in the middle of the forenoon and afternoon in order that the foal may get its food (see fig. 8), but in no case should a foal suckle a mare that is very warm, as digestive disorders are liable to follow. If possible, do not use the mare for purposes which will keep her away from the farm for a long time, as the foal will either go too long without nursing or will be worn out by following the mare. When left at the stable the foal should be kept in a roomy, clean box stall in company with another one of about the same age if possible.

At about 2 months of age the foal will take dry feed, which should be supplied through the dam's grain box. This makes it necessary to furnish her with such feeds as ground oats, corn meal, and bran. A little later a "creep" should be built in the stall or pasture, inside of which the foal can be supplied with grain without having to share it with its mother. A creep is simply a partition that keeps the mare out of the inclosure, but is far enough from the ground so that the foal can walk under it. A handful of ground oats should be given at first and the quantity increased slowly as the foal grows. The maximum amount should be about 1 pound a day till weaning time.

### RAISING THE ORPHAN FOAL

Sometimes a mare dies shortly after foaling, thus leaving her foal dependent on artificial feeding for its sustenance; and some mares furnish an insufficient amount of milk for their colts. Cow's milk furnishes a most logical substitute for mare's milk, but as the composition is somewhat different, certain changes or modifications are necessary in order that the supplied diet be not too dissimilar from the natural. The following table gives the average composition of the two kinds of milk:

| | Water | Protein | Fat | Sugar | Ash |
|---|---|---|---|---|---|
| Cow's milk | 87.17 | 3.55 | 3.69 | 4.88 | 0.71 |
| Mare's milk | 90.78 | 1.99 | 1.21 | 5.67 | .35 |

Milk from a recently freshened cow, which is not rich in butterfat, should be diluted about one-fourth with fresh water. A tablespoonful of sugar and about 3 teaspoonfuls of limewater should be added for each pint. This mixture should be supplied to the colt at about body temperature. A bottle with a rubber nipple, or even a finger of a kid glove with a fair-sized hole in it fitted over the end of a spout of a vessel, such as a teapot, will serve as a convenient utensil in getting the foal to take the milk. If the finger of a kid glove is used

it should be clean. At first about one-half a cup of milk should be given every hour, the quantity to be increased slightly and the intervals to be lengthened gradually as the foal grows older. In about two months skimmed milk may be substituted for whole milk, and in addition one of the following rations should be fed: One part of flaxseed meal boiled to a jelly, and 2 or 3 parts of bran; or 2 parts ground oats, 1 part corn meal, and one-half part flaxseed meal; or 2 parts of bran, 2 parts corn meal, and 1 part linseed meal. Feed a double handful a day at first and increase gradually.

Raising a foal by hand is not a job for the careless and indifferent. It requires patience, painstaking care, perseverance, judgment, and cleanliness. The vessel in which the milk is supplied should be scalded thoroughly each time it is used. Unclean receptacles for the milk and irregular intervals for feeding probably will cause scours.

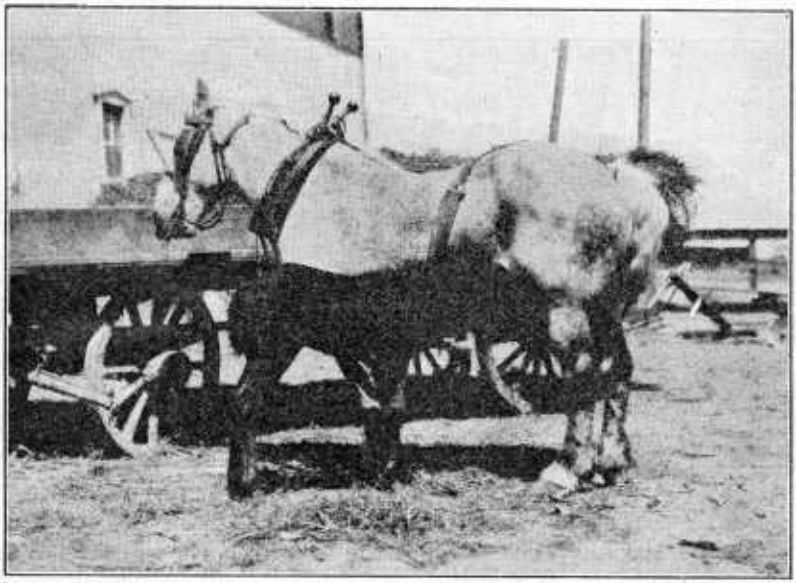

FIG. 8.—The young foal should be allowed to suckle the working mare at regular intervals several times a day

The quarters should be very clean, and the orphaned foal should have company of some kind. Another foal is desirable, but even a calf is better than no company. A grassy paddock with abundant shade, fresh water, and protection from flies increase the orphan's chance of proper development.

### SCOURS

A most common cause of scours in foals is when they get too much milk at irregular intervals; consequently, better management is the first step in remedying the trouble. Castor oil is often used to check scours, 1 or 2 ounces being the dose for a young foal. Raw eggs are also used successfully. Blood meal is considered one of the best remedies, the quantity used being one-tenth to one-sixth of the grain ration. Powdered tannic acid also gives quick relief, the dose

being from 5 to 15 grains. For other than a mild case a competent veterinarian should be consulted.

### WEANING

Foals belonging to mares that work hard should be weaned earlier than those belonging to mares which are practically idle. While most foals are weaned when about 5 or 6 months old, it is well to remember that it is economical to feed a foal through its mother. However, in case the mare is again in foal, if she is allowed to nurse for more than six months it may decrease the vitality of the next foal. If the foal is getting plenty of nourishment from grain, grass, and roughage, the young animal will not be seriously set back when shut off from its dam's supply of milk. When taken away from its mother it should be placed with another foal of the same sex and age in an inclosure where they can not possibly get out or be injured. Feeding

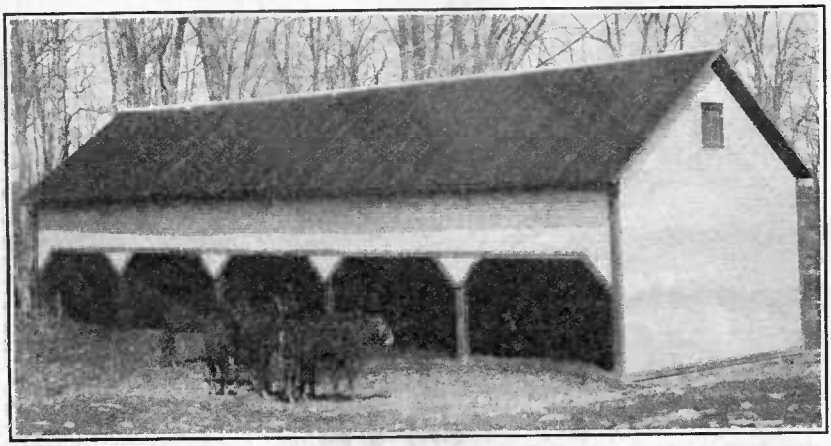

FIG. 9.—A shed open on the south side. A desirable place in which to winter colts unless the climate is too severe

grain is not absolutely necessary if the foal is on good grass and has been accustomed to it; nevertheless, it has its advantage, especially with draft animals. Foal feeding always should be practiced with foals belonging to mares that are worked.

The foal should not nurse more than once after it has been taken away. The excess milk from the mare's udder should be taken from three to five times a day, but enough should be left so that her system will begin to absorb the milk; otherwise the drying-up process will be delayed unnecessarily. Not withdrawing milk enough will cause the udder to cake and spoil. Camphorated oil, petrolatum, or lard rubbed on the udder will aid in keeping it soft.

## FEEDING AND MANAGEMENT OF YOUNG HORSES

### CARE AND FEEDING DURING FIRST WINTER

Colts may be housed satisfactorily in either the stable or an open shed. The shed shown in Figure 9 is practicable where it is necessary to provide shelter for several head. The main requirements are that the quarters be dry, sanitary, and provide fairly good pro-

tection from winds. Several foals may run together if the weaker ones are not driven away from their feed by the stronger. The quarters should be kept clean and well bedded and occasionally should be disinfected. Lice are to be suspected when the animals get to rubbing and lose patches of hair. Thorough washing with the proper solutions of coal-tar disinfectants will kill lice. It costs money to feed lice; consequently efforts should be made to keep the colts free of them. The foals should be in the open every day that is not stormy; it is harmful, however, for them to be in a cold rain. During the first winter the foal should be taught to lead and to stand tied.

Feeds that promote growth should be supplied. Good, clean clover hay is palatable and slightly laxative. Timothy hay commonly is fed. Well-cured alfalfa hay, free from dust, is one of the best roughages for growing, but because of its relatively high protein content it generally is economical to supplement it with other roughage, such as timothy, mixed hay, or corn fodder. Besides lending variety to the ration, such a method of feeding alfalfa would offset any likelihood of kidney or bowel irregularities. Sheaf oats can be used to advantage to supplement other roughage. The animals should not be allowed to gorge themselves on dry feed. They should be given only what they will clean up readily, but at the same time enough feed should be supplied. Oats, corn, and peas, preferably well ground, are suitable grains. Bran, oil meal, or gluten feed will add protein and lend variety. Cottonseed meal should not be fed to foals. Appropriate grain rations for the first winter are: 2 parts corn, 5 parts oats, 3 parts bran, and 1 part oil meal; or 4 parts oats, 1 part corn, and 1 part bran.

Silage should not be fed to foals to any considerable extent. Sliced roots, such as carrots and sugar beets, are very palatable and have a cooling effect on the digestive system. The quantity of feed generally should be regulated by the appetite, although occasionally the appetite may be too ravenous to be a good indication. The general condition of the colt and the droppings should be observed daily. Usually not more than 1 pound of grain per 100 pounds of live weight should be fed until the animal is 2 years old. A liberal supply of salt and pure water and plenty of fresh air and exercise are essential for the proper development of young horses. Idleness succeeding exercise causes constipation. It is often said that a horse is made during its first winter. Certainly this is a critical time in the animal's life, and at no other age will proper feed and attention do as much to make a good horse. If stunted during the first winter the animal never gains proper size and shape.

#### FEED AND CARE DURING THE SECOND SUMMER

Foals should be changed from dry feed to pasture gradually, and should not be turned on pasture until the grass is old enough not to be washy. Grass is an indispensable factor in the economical and proper physiological development of young horses. Frequently in protected bluegrass mountain valleys they thrive the year round on pasture alone. A visit to the foal pasture every few days may be the means of promptly discovering cases of sickness or injury. The feet of the young animals should be noticed on such visits, and if

the hoofs are too long or high on one side they should be trimmed properly. A failure to keep the feet level may result in cracked hoofs or crooked joints. Barbed wire should not be used for fencing the pasture; smooth woven wire or fence boards are preferable. If a colt should be cut, disinfect the wound; and if it is a very large cut, have it sewed up. The wound should be dusted frequently with boric acid or air-slaked lime until healed, and then greased with petrolatum so that the hair will grow. The animals should have plenty of fresh water and salt, and in hot weather they require shade.

### CARE AND FEEDING DURING SECOND WINTER

During the second winter the feed and management should be nearly the same as for the first winter, except that the quantity of feed should be increased somewhat, the colt tied up in his stall, and handled frequently. Education by gentle and careful but firm handling at this age will save much strenuous labor later. In this connection Farmers' Bulletin 1368, "Breaking and Training Colts," should be consulted.

### THE 3-YEAR OLD

The succeeding years are largely a repetition of those already discussed so far as feed and management are concerned, although the quantity of feed must be gradually increased as the animal grows. The prime general essentials for the proper development of horses from the yearling stage until they are put to work are: Fresh air, pure water, plenty of exercise, nutritious, palatable feed in sufficient quantity, and protection from severe weather.

### SUMMARY

Good breeding is absolutely essential to the production of marketable horses which will bring top prices, but good breeding must be supplemented by proper feeding and management if the finished product is to be satisfactory. Figures collected at the Chicago stockyards show that flesh on high-class draft horses is worth about 25 cents a pound. It is worth equally as much on high-class horses of the lighter types. Certainly, then, it is more profitable to give the colts the good feed produced on the farm than to sell such feed and attempt to keep the colts and mares on unsalable trash. Poor feed in scant quantity makes ewe necks, waspy waists, cat hams, rough coats—in short, an unsalable horse.

Horses always are needed to do farm work as well as for other purposes, and generally they can be raised from farm mares more cheaply than they can be purchased, while the surplus, if of proper breeding and liberally fed on suitable, balanced rations, will find ready sale at good prices, because they will have the characteristics that suggest the ability to do work satisfactorily and profitably.

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